

## REMARKS

### Status of the case

The present invention provides novel lithium mixed-metal materials that are useful in rechargeable lithium batteries. These materials have the nominal formula  $\text{LiMI}_{1-y}\text{MII}_y\text{PO}_4$ , wherein MI is at least one transition metal from Groups 4 to 11 of the Periodic Table and has a +2 valence state; MII is at least one metallic element which is from Groups 2, 12, or 14 of the Periodic Table and has a +2 valence state; and  $0 < y < 1$ .

In the Office Action dated November 28, 2001, the Examiner made final the restriction requirement of record, but withdrew the requirement for election of species. The Examiner then rejected the elected Claims 42-134 under either 35 U.S.C. §102 or §103.

In this Amendment, Applicants cancel Claims 38-41, without prejudice, as directed to the non-elected species. Applicants also traverse the rejections of record. Claims 42-55, 80-82, 87-95, and 108-120 are canceled, without prejudice, so as to focus prosecution on embodiments among those preferred in the present invention. It should be understood, however, that cancellation of these claims in no way constitutes admission that the rejections of record are in any way appropriate to the patentability of the subject matter of these claims. Applicants intend to present claims to subject matter of the canceled claims in a divisional application. After this Amendment, Claims 56-79, 83-86, 96-107, and 121-134 remain pending, as originally presented.

### The rejections under 35 U.S.C. §102 have been obviated.

The Examiner issued two rejections under 35 U.S.C. §102. The first was a rejection of Claims 42-55, 80-93, 95, 108-118, and 120, as being anticipated by Japanese Patent Publication 11-025983, Kariru, published January 29, 1999. The Examiner stated, "Kariru discloses lithium

batteries including active materials having the formula  $\text{LiM}_{1-x}\text{Me}_x\text{PO}_4$  where M can be Co, Ni, or Mn, and Me can be Mg, Fe, or Zn [or Ni, Co, Mn, Ge, Cu, or Cr]”.

This rejection has been obviated by cancellation of all claims subject to the rejection, other than Claims 83-86. Applicants submit the rejection is improper with respect to Claims 83-86 in that those claims are dependent upon Claims 56, 60, 64, and 67, which were not subject to the rejection. Referring to the formula  $\text{LiM}_{1-x}\text{Me}_x\text{PO}_4$ , *Kariru* requires M to be cobalt, nickel or manganese; in the Applicant’s invention, M comprises iron. If, in fact, this rejection was intended to subsume Claims 83-86, Applicants submit that the rejection is improper, and request that it be withdrawn.

Claims 42-55 were also rejected as being anticipated by German Patent Publication 40 24 409, *Geismar et al.*, published February 8, 1992. (An English-language translation was provided with Applicants’ Supplemental Information Disclosure Statement filed October 11, 2001.) The Examiner alleges that *Geismar* discloses compounds  $\text{LiCu}_{0.99}\text{Zn}_{0.01}\text{PO}_4$  and  $\text{LiCo}_{0.99}\text{Zn}_{0.01}\text{PO}_4$ . This rejection has been obviated by cancellation of the rejected claims.

The subject matter of the pending claims is not obvious.

The Examiner rejected Claims 56-79, 94, 96-107, 119, 121, and 134 under 35 U.S.C. §103(a) as being unpatentable over *Kariru*. The Examiner stated, “As discussed above, *Kariru* discloses applicants’ invention essentially as claimed, with the exception that the specific species of the electroactive material  $\text{LiM}_{1-x}\text{Me}_x\text{PO}_4$  disclosed by *Kariru* are different from those recited by the applicants. However, as noted above, *Kariru* explicitly disclose some of the species claimed by the applicants.”

Applicants note that Claims 122-133 are not addressed in this or any other rejection. This is appropriate, since the claimed batteries having an insertion anode are novel and non-obvious. In particular, such batteries are not obvious from *Kariru*, which only exemplifies batteries having lithium metal anodes. In such lithium anode batteries, the source of lithium for the battery is the anode. During cycling, lithium is added to the cathode material. In the batteries of Applicants' Claims 122-133, the cathode is the source of lithium. During cycling, lithium is withdrawn from the cathode material. This is a significant difference, making the Applicants' batteries not obvious from those exemplified by *Kariru*.

Furthermore, as recognized by the Examiner, the electroactive materials of *Kariru* are different from those of Applicants' material, electrode and battery claims. *Kariru* does not, however, disclose any species within the pending claims. The fact that *Kariru* may disclose compounds within the scope of other subject matter within Applicants' disclosure is irrelevant. Obviousness of the pending claims must be supported by teachings found in the art, not by Applicants' own disclosure. The alleged relevance of art to a first set of claims cannot be extrapolated to a second set of distinct claims absent a clear teaching in the art that links the subject matter of the art to the second set of claims. *Kariru* provides no such link.

*Kariru* only discloses materials having cobalt, nickel, or manganese in combination with a second metal. The second metal may also be cobalt, nickel, or manganese (so the material only contains a single metal) or any of six other metals; one of them may be iron. Of the six examples, three describe materials having only manganese, nickel, or cobalt. These single-metal materials are also the only ones for which data is provided and, thus, appear to be preferred by *Kariru* over materials having two different metals.

While iron, magnesium, and zinc are among the second metals that may be included in the *Kariru* materials, the formula of *Kariru* excludes materials having any combination of these metals. Furthermore, *Kariru* provides no suggestion that iron could be used instead of cobalt, nickel or manganese. The fact that *Kariru* failed to disclose such materials strongly evidences that they considered them to have no utility. *Kariru* discusses the need for “careful selection” of cathode materials. See translation, on page 8, lines 4-5. Thus, if anything, the requirement of cobalt, nickel, or manganese in *Kariru* teaches away from Applicants’ invention combining iron and a non-transition metal such as magnesium or zinc. Accordingly, the subject matter of the pending claims is not obvious from *Kariru*.

The Examiner also rejected Claims 56-79 under 35 U.S.C. §103(a) as being unpatentable over *Geismar*. The Examiner stated, “As discussed above, *Geismar* disclose applicants invention essentially as claimed, with the exception that the specific species of the materials  $\text{LiM}_{1-x}\text{Me}_x\text{PO}_4$  disclosed by *Geismar* et al. are different from those recited by the applicants. However, as noted above, *Geismar* et al. disclose some of the species claimed by the applicants.”

As with *Kariru*, the Examiner correctly notes that the materials of Applicants’ invention are different than those of *Geismar*. *Geismar* does not, however, disclose any species within the pending claims. Again, the fact that *Geismar* may disclose species within the scope of other claims is irrelevant. Obviousness of the pending claims must be based on teachings in the art, not on Applicants’ disclosure.

Moreover, *Geismar* discloses materials only for use as pigments. There is no suggestion of using such materials in electroactive materials. (Thus, the Examiner appropriately did not reject the electrode and battery claims under *Geismar*.)

The object of the *Geismar* invention is “to prepare temperature-stable green, turquoise and blue pigments in a single system, hue and intensity being generated by varying the quantity of chromic copper and/or cobalt ions with the quantity of achromatic zinc ions in the alkali phosphate system (K, Na, Li).” See translation at page 4. Four tables are set forth in *Geismar*, describing the color properties of a total of sixty-one compounds. None of these compounds contain iron. There is no suggestion anywhere in *Geismar* that such compounds could contain iron. Indeed, Applicants submit that substitution of iron for another metal in *Geismar's* compositions would likely yield a pigment having significantly different properties. Thus, one of ordinary skill in the art would not look at the *Geismar* disclosure -- which is focused on making cobalt and copper pigments having specific desired color characteristics -- as rendering obvious materials having iron. Applicants' materials are not obvious for the preferred utility of Applicants' invention (battery actives); they are also not obvious for the utility disclosed in *Geismar* (pigments).

Summary:

Applicants submit that the claimed invention is novel and not obvious. In particular, the claimed materials, electrodes and batteries are novel and non-obvious over both *Kariru* and *Geismar*. *Kariru* exemplifies fundamentally different battery systems (having a metallic anode) than those preferred by Applicants, and discloses significantly different cathode materials. In fact, *Kariru* teaches away from cathode materials having iron combined with a non-transition metal. *Geismar* teaches nothing about batteries, and does not render obvious materials having iron.

Accordingly respectfully request withdrawal of the rejections of record, and allowance of all claims.

Respectfully submitted,

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